Factors Affecting Solubility

Structure Effects

-solutes can be described as :

->hydrophobic (water-fearing)

Ex.

->hydrophilic (water-loving)

Ex.

Pressure Effects

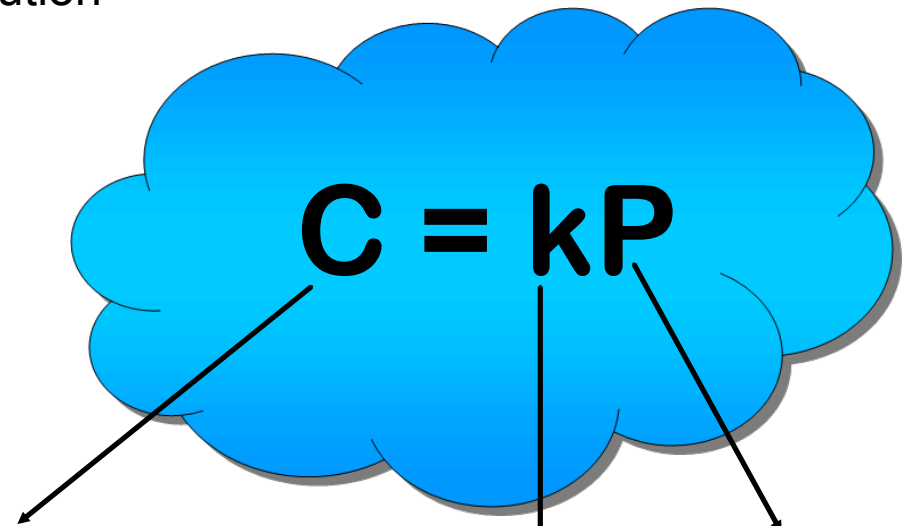
- increase in pressure increases the solubility of a gas in solution

- the # of gas molecules per unit volume increases and the gas enters the solution at a higher rate than it leaves the solution

- as the concentration of the dissolved gas increases, the rate of escape of the gas molecules increases until a new equilibrium is reached

Henry's Law

the amount of a gas dissolved in solution is directly proportional to the pressure of the gas above the solution



Concentration of dissolved gas

Henry's Law Constant: characteristic for a particular solution

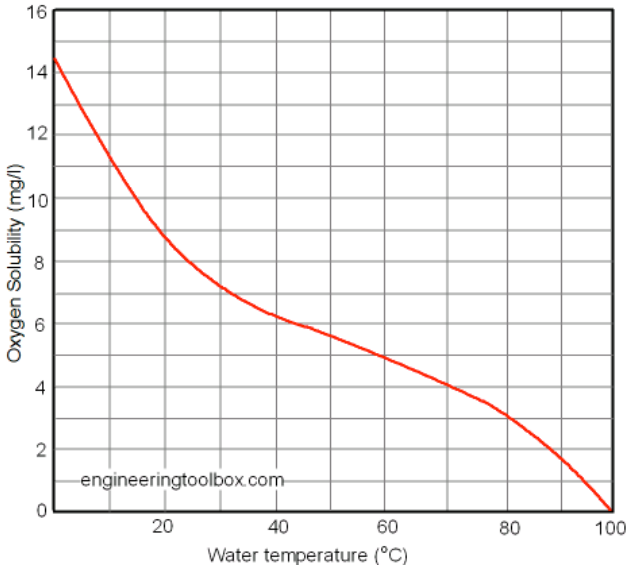
Pressure of the gaseous solute above the solution

Sample Calculation:

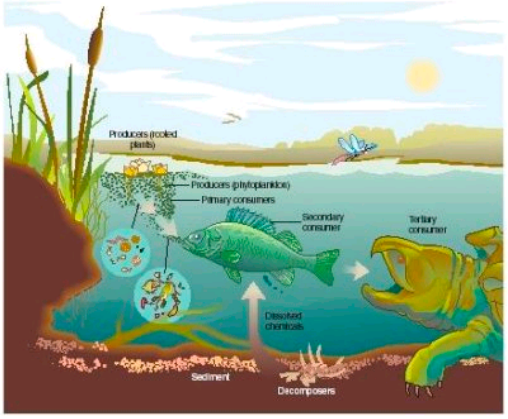
Calculate the concentration of CO_2 in a soft drink that is bottled where the pressure of CO_2 is 4.0 atm over the liquid at 25℃. The Henry's Law Constant for CO_2 in water at this temperature is 3.1×10^{-2} mol/L-atm.

Temperature Effects

- from chapter 7, we know that solubility of an aqueous solution usually increases as temperature increases
- however, solubility of a gas in water typically decreases with increasing temperature
- this is due to the increased speed/kinetic energy of the particles of the solute



How does this relationship affect water ecosystems?



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Water ecosystems are affected by this relationship through something called thermal pollution

Thermal pollution : industries use water from lakes to cool their reactions

-after being used, they send the water back which is warmer than it was before

-since the water is warm it will have less oxygen dissolved into it.

-this will limit the amount of oxygen that can get to aquatic life at the bottom of the lake

Homework!

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